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THE FERROALLOY INDUSTRIES AND TARIFF LEGISLATION

THE transfer of power from one political party to another in the United States is usually accompanied with more or less alteration in tariff policy. For nearly a century the tariff has been a party issue, and during much of this period a leading issue. Thus in accordance with the changed political complexion of the government in Washington, the result of the election of last November, the country is again at the threshold of another revision of tariff schedules.

The situation, however, with regard to foreign trade policy is in several important respects different from what it has ever been in the past. Since the outbreak of the World War in 1914 the United States has been transformed from a debtor into a creditor nation. Its mercantile marine, which before the war exerted a negligible influence on international trade, is now second only to that of the United Kingdom and embraces nearly a third of the world's tonnage. Both of these changes will tend to affect the relative proportions of " visible " exports and imports in the years to come. Furthermore, among the leading commercial countries of the world today the United States is the only one whose monetary basis can be said to be the gold standard.[1]

Another new element in the situation is the fact that during the war a number of domestic industries developed to meet the demand for commodities which had hitherto been supplied in large part by imports from foreign countries. Among these industries, two of the most noteworthy were the preparation of certain chemicals such as dyes and drugs, which hitherto had been imported mainly from Germany, and the manufacture of certain alloys, which likewise had been largely imported from Germany and England and were used in the making of steel. While the former has attracted greater public attention on account of the direct utilization of its products by the public generally, the latter has more industrial and political significance and reveals many phases of the present tariff problem in a way that few other industries do. The manufacture of the ferroalloys illustrates the various questions which arise in tariff legislation with reference to proper classification, the merits of specific and *ad valorem* rates, the adjustment of compensatory duties, and varying competitive conditions; and all of these are shown in the light of a new world situation.

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[1] Certain nations like Japan, Switzerland, the Scandinavian kingdoms and Argentina, whose trade is less in volume than that of the United States, Great Britain, France etc., are still on a gold basis. The reduced foreign exchange in the case of some of these countries, e. g. Argentina, is attributable to prohibition of exports of gold and not to inflation of the currency.

The ferroalloys are special products consisting mainly of iron and some other chemical element whose use in the manufacture of steel gives the latter certain desirable qualities. The alloying element is generally a metal of much higher value than iron and is usually the principal determinant of the price. Of the other ingredients carbon is frequently the most conspicuous, but in several alloys its reduction to an insignificant percentage of the total composition materially adds to their value.

Among the ferroalloys the most important from the standpoint of tonnage and value are the iron-manganese alloys (spiegeleisen and ferromanganese),[1] ferrosilicon, ferrochrome, ferrotungsten and ferrovanadium. There are, however, several others like ferromolybdenum, ferrotitanium, ferrophosphorus, and certain minor ferroalloys which are produced only for experimental purposes. Over half of the country's tonnage of ferroalloys consists of spiegeleisen and ferromanganese, the use of which is absolutely necessary in the manufacture of Bessemer and open-hearth steel. Ferrosilicon is also very commonly used in steel manufacture, especially in high-grade castings. Both the iron-manganese alloys and ferrosilicon are sold by the ton. Ferrochrome, ferrotungsten and ferrovanadium are more expensive and are produced in smaller quantities. They are sold by the pound of contained chromium, tungsten or vanadium, respectively.

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[1] These alloys consist mainly of iron and manganese. Where the manganese content is less than 45 per cent the alloy is called spiegeleisen and where it is 45 per cent and above, it is called ferromanganese. The standard grade of spiegeleisen is 20 per cent manganese and that of ferromanganese, 76 to 80 per cent manganese. The latter alloy is more expensive and now the more commonly used. In the manufacture of "soft" steel, ferromanganese is absolutely essential.

The ferroalloys perform one or both of two functions; they act as deoxidizing agents in the manufacture of steel or as alloying agencies. Steel made by the Bessemer or open-hearth process without the use of ferroalloys is practically valueless on account of the existence of " blowholes " or contained oxygen. " Scavengers " are therefore employed to clean the steel while it is still in a molten condition. It has also been found that for most practical purposes iron, like other metals, is of less value in its pure form than in the form of an alloy. Hence, in the manufacture of all steel made by the Bessemer and open-hearth processes[1], the iron-manganese alloys—spiegeleisen and ferromanganese—are employed as deoxidizing and alloying agents, or in other words to clean the steel and add from 0.4 to 0.6 per cent of manganese. Where it is desirable to carry the cleansing process to a more advanced stage than is possible with ferromanganese or spiegeleisen or add other qualities to the steel than those given to it by manganese, other ferroalloys like ferrosilicon, ferrochrome, ferrotungsten or ferrovanadium are employed.

The ferroalloy industries, while not among the largest of our manufacturing industries if measured by amount of capital invested, number of men employed, or quantity and value of output, are of supreme importance to some of the leading branches of production. Steel manufacture on its present large scale absolutely depends upon the use of certain ferroalloys. The efficiency of the automobile, machine tools, and certain electrical appliances is due in large measure to the addition of certain metals to the steel of which these articles are composed, the addition being made possible by the use of ferroalloys.

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[1] The great bulk of the steel produced in the world today is made by the Bessemer and open-hearth processes. Thus in the United States there were produced in 1919, 34,671,232 tons (gross) of steel, of which 34,220,256 tons were made by the processes named.—(*Annual Statistical Report of the American Iron and Steel Institute* for 1919, p. 23.)

The production of steel has increased in amount with the use of ferroalloys and has been largely adapted to specialized uses. Prior to the middle of the nineteenth century, when the Bessemer process of manufacture was introduced, iron while looked upon as a common or " base " metal was consumed in very limited quantities compared with the present. How restricted this use was can be seen by comparing the estimated world's output of iron and steel and the *per capita* production in terms of pig iron for each decennial year from 1820 to 1910 inclusive, and for 1913, the last pre-war year, and 1918, the last year for which world figures are at present obtainable.

TABLE NO. 1

THE WORLD'S PRODUCTION OF IRON AND STEEL IN TERMS OF PIG IRON, 1820–1918

Year.	Population of world.	Production of iron and steel in terms of pig iron.	Per-capita production of pig iron.
	Millions.	Million tons.	Pounds.
1820	780	1.0	2.9
1830	847	1.8	4.8
1840	950	2.7	6.4
1850	1,075	4.7	9.8
1860	1,205	7.2	12.6
1870	1,310	11.9	20.4
1880	1,439	18.0	28.0
1890	1,488	27.2	41.0
1900	1,543	40.4	58.1
1910	1,616	65.8	91.2
1913	1,652	77.8	105.5
1918	1,699	62.0	81.7

During the first two decades of the nineteenth century there was little change in the *per capita* production of pig iron—from 2.8 pounds to 2.9 pounds. From 1820 to 1860 the *per capita* production more than quadrupled and during the last four decades of the century more than quadrupled again. From 1900 to 1913 the world's *per capita* output almost doubled. The decline from 1913 to 1918 was, of course, attributable to the war. If the figures for the total and *per capita* production of pig iron were limited to the leading commercial and industrial nations of the world, they would illustrate the development of the iron and steel industry in a still more striking manner. In the United States, for example, the output of pig iron from 1850 to 1918 increased from 563,755 to 39,054,644 long tons, or from a *per capita* production of 54.4 pounds in 1850 to a *per capita* output of 833 pounds in 1918.[1] Thus while the *per capita* production of the world in 1918 was approximately nine times that of 1850, the production of the United States in 1918 was fifteen times that of the earlier year. The increase for this country would be still greater if scrap iron and steel, which to a large extent take the place of pig iron in the open-hearth process of steel manufacture, were added.[2]

While the production and utilization of iron and ordinary carbon steel have shown a remarkable growth in recent times, the manufacture of alloy steels has been characterized by a relatively more rapid development. In the United States the output of alloy steels increased from 567,819 gross tons in 1910 to 1,787,853 gross tons in 1918, or in other words, more than trebled in less than a decade. During the same period the country's output of ordinary carbon steel, irrespective of process of manufacture, increased about 67 per cent. While there was some falling-off in the production of alloy steels in 1919 the output was still nearly three times what it was in 1910 and over seven times the production of 1909.[3]

The military value of alloy steels accounted for part of this growth during the war years. Silicon steel was used in the manufacture of shrapnel bars because on explosion it was breakable into a number of pieces. Chrome steel was employed in the production of armor plate and projectiles because of its hardness and resistance to shock. Tungsten added to carbon steel in percentages ranging from twelve to twenty is what makes the much-talked-of "high-speed steel". This steel has the quality of maintaining its temper at red heat, and by so doing increases the efficiency of machine tools from 400 to 700 per cent as compared with the old carbon-steel tools. This increased efficiency was of inestimable value during the late war.

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[1] *Statistical Abstract* 1919 and *Annual Statistical Reports of the American Iron and Steel Institute* for the years 1916 to 1919 inclusive.

[2] The percentage of scrap iron and steel used by the open-hearth process is usually about fifty in the eastern United States and over eighty on the Pacific Coast.

[3] *Annual Statistical Report of the American Iron and Steel Institute*, 1919, pp. 24 and 27.

The cessation of hostilities, however, has not seriously reduced the demand for alloy steels. As has been indicated already, alloy steels are being used in larger and larger quantities in the automobile industry, in the manufacture of electrical applicances and in the production of structural material and machine equipment.

The comparatively recent development of the ferroalloy industries accounts for the late mention of their products in the tariff laws of the country. The treatment of the ferroalloys is characteristic of much of our tariff legislation. Spiegeleisen was mentioned for the first time in the Act of 1883 and was then classed with "iron in pigs, iron kentledge" etc. Ferromanganese and ferrosilicon were first mentioned in the law of 1890 and were likewise grouped with "iron in pigs" and given the same rate of duty.[1] Until the Act of 1909 the other ferroalloys and alloying metals were not mentioned, but, by various treasury decisions, were classed either with "iron in pigs" or "metals unwrought". The raw material of ferrochrome—"chromate of iron or chromic ore"—is mentioned in the laws of 1890, 1894 and 1897. In the first act a rate of "15 per centum *ad valorem*" was imposed, and in the last two the ore was placed on the free list.

In the Act of 1909 a special paragraph[2] was devoted to the ferroalloys and alloying metals, with the exception of ferromanganese and spiegeleisen, which continued to be classified with "iron in pigs". This paragraph reads as follows:

> Chrome or chromium metal, ferrochrome or ferrochromium, ferromolybdenum, ferrophosphorus, ferrotitanium, ferrotungsten, ferrovanadium, molybdenum, titanium, tantalum, tungsten, or wolfram

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[1] Act of 1890, paragraph 134.

[2] Act of 1909, paragraph 184.

metal, valued at two hundred dollars per ton or less, twenty-five per centum *ad valorem;* valued at more than two hundred dollars per ton, twenty per centum *ad valorem;* ferrosilicon containing not more than fifteen per centum of silicon, five dollars per ton; ferrosilicon containing more than fifteen per centum of silicon, twenty per centum *ad valorem.*

This paragraph was the first in any of our tariff acts to enumerate the ferroalloys usually produced in electric furnaces and the metals themselves unalloyed with iron. A noteworthy distinction was made between ferrosilicon produced in electric furnaces (ferrosilicon containing more than fifteen per cent silicon) and ferrosilicon manufactured for the most part in blast furnaces (silicon content fifteen per cent or less). This distinction is of great importance, especially when specific rates are imposed.

The Act of 1913 imposed a uniform *ad valorem* rate of fifteen per cent upon all the ferroalloys,[1] except spiegeleisen and ferromanganese, which were classed as heretofore with "iron in pigs" and placed upon the free list.[2] The enumeration of the ferroalloys and alloying metals was the same as in the Act of 1909 except that ferrosilicon was mentioned with the other alloys and given the same *ad valorem* rate of duty. There is also the additional phrase, "and other alloys used in the manufacture of steel, not specially provided for in this section".

The segregation of the iron-manganese alloys from other ferroalloys is not logical, but it illustrates the tenacity of old associations and groupings in tariff legislation. There is no reason why spiegeleisen and ferromanganese should be classed with pig iron other than that they were originally so grouped when first mentioned in our tariff laws and that this classification was based upon the fact that they were made in blast furnaces. In character and function they are entirely distinct from pig iron, and belong to the group of ferroalloys as much as ferrochrome, ferrotungsten or ferrovanadium.

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[1] Act of 1913, paragraph 102.

[2] *Ibid.*, paragraph 518.

In addition to the illogical grouping of the iron manganese alloys with "iron in pigs" instead of with the ferroalloys, there is in the Act of 1913 the uniform *ad valorem* rate of fifteen per cent in the case of the dutiable alloys, irrespective of the competitive position of producers. Thus the manufacturers of ferrovanadium, who supply the bulk of the world's output of that ferroalloy, are afforded the same protection as the producers of ferrotungsten, who are subject to the keenest kind of foreign competition. Blast-furnace ferrosilicon, which is produced more cheaply in the United States than anywhere else in the world, is subject to the same rates of duty as high-grade electric-furnace ferrosilicon, which is manufactured much more cheaply in Canada and Norway than in this country. The purpose of this uniform *ad valorem* rate was not of course to establish a simple horizontal duty from which revenue was to be collected irrespective of any principle of protection, but to afford moderate protection to a group of industries producing commodities which had similar uses and presumably were manufactured under approximately identical competitive conditions.

In foreign countries—notably Germany, France and Sweden—where tariff protection is accorded to domestic producers of ferroalloys, the rates are usually specific. In very few cases are the ferroalloys other than the iron-manganese alloys and ferrosilicon specifically mentioned, and in none are the rates of import duties accurately adjusted to cover the great variation in alloy content and consequently in value. Thus, under the German tariff almost all the ferroalloys at the beginning of the war were dutiable at one mark per 100 kilograms, or about $0.11 per 100 pounds at the then rate of exchange, under the provision relating to "pig iron and non-malleable iron alloys".[1] In the French tariff, which has the most logical classification of ferroalloys found in any tariff system, ferrosilicon with a silicon content of eighty-nine per cent is dutiable at the same specific rate as ferrosilicon with a silicon content of twenty per cent,[2] notwithstanding the fact that the market value of the former is usually two and a half to four times that of the latter.

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[1] Kelly, *Customs Tariffs of the World*, 1918, Tariff No. 777, p. 390. An exception is made in the case of ferrosilicon with a silicon content greater than twenty-five per cent, which is admitted free.

[2] Kelly, *Customs Tariffs of the World*, 1920, Tariff No. 205 b, p. 273.

Both at home and abroad tariff legislation has proceeded without any careful analysis of competitive conditions, compensatory duties, tariff classification, and the merits of the kind of rates imposed. The problems which demand consideration in connection with these factors are well illustrated by the industries devoted to the manufacture of the ferroalloys and serve to show how complicated is the task of framing a consistent tariff bill.

Foreign competition varies greatly not only among the different ferroalloys but in some cases among different grades of the same alloy. The domestic producer of ferrovanadium experiences no competition from abroad, inasmuch as almost the entire world's output of this alloy is controlled by American interests.[1] Manufacturers of ferrochrome and ferrotungsten, on the other hand, experience intense foreign competition. In the case of the iron-manganese alloys, very little spiegeleisen is imported, but relatively large amounts of ferromanganese. Prior to the outbreak of the war over half the ferromanganese consumed in the United States was imported, and the bulk of the domestic output was produced by the United States Steel Corporation for its own use. Low-grade domestic ferrosilicon —the alloy containing fifteen per cent or less silicon—has met with little or no foreign competition in American markets, while the high-grade alloy has been subject to considerable foreign rivalry.

Aside from the exceptional conditions obtaining in the manufacture of ferrovanadium, the competitive strength of the American producer depends mainly upon the process of manufacture and whether his ores are of domestic or foreign origin. The great bulk of the ferroalloy output of the world is now produced by one of two processes—the blast furnace and the electric furnace methods. A very small percentage of the so-called "carbon-free" ferroalloys[1] is made by the aluminum process, a thermit process in which aluminum is used as a reducing agent. A relatively insignificant and diminishing quantity is still manufactured in crucible furnaces. Practically speaking, however, it can be said that the ferroalloys are manufactured in blast or electric furnaces. Where very high temperatures are necessary the electric furnace is employed and sometimes is used experimentally where the blast furnace is also applicable and more economical.

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[1] Vanadium ores are mined in Peru and Colorado. The Peruvian mines are owned by the Vanadium Corporation of America. The Colorado mines, formerly owned by the Primos Chemical Co., were also taken over by this company in December, 1919. Very little vanadium ore is produced in other parts of the world.

All the spiegeleisen and most of the ferromanganese are made in blast furnaces. Ferrosilicon containing fifteen per cent or less silicon is also for the most part a blast-furnace product. Where the silicon content rises above fifteen per cent this alloy must be manufactured in the electric furnace. Ferrochrome, ferrotungsten, ferrovanadium, ferrotitanium and nearly all the rarer ferroalloys are electric-furnace products.

With respect to the source of raw material, especially ores, this country is obliged to rely largely upon foreign material. Manganese ores supply the manganese content in spiegeleisen and ferromanganese; chromite, the chromium in ferrochrome; tungsten-bearing ores (of which there are four main varieties), the tungsten in ferrotungsten; and vanadium ores, the vanadium in ferrovanadium. Silicon, the principal constituent of ferrosilicon and the element which gives this ferroalloy its value, is derived from silica which of course is abundant the world over.

Manganese ores of low grade are abundant in the United States, but high-grade ores (ores with a manganese content of forty-eight per cent or more) are very scarce and must be imported.[2] The low-grade ores are well suited to the manufacture of spiegeleisen, but not of ferromanganese. High-grade ores are therefore imported from India and Brazil. Chromite is also scarce in this country and when found has the added disadvantage of a too high iron content. Most of the chromite used in ferroalloy manufacture is imported from New Caledonia and Rhodesia. The deposits of tungsten-bearing ores are tolerably large in the United States, but are generally far below the surface and, therefore, very expensive to mine. American ores, however, are free from the deleterious substances, tin, copper, arsenic etc., often found in the foreign product, but this merit is not sufficient to overcome the handicap of high cost. Almost all the tungsten-bearing ores now used in this country in the manufacture of tungsten metal and ferrotungsten are imported—mainly from China. Vanadium ores are found in Colorado, but the domestic supply furnishes only a small part of the home consumption. All the imported material comes from Peru where the mines, as already stated, are owned by American interests.[1]

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[1] The "carbon-free" ferroalloys are ferrochrome, ferrotungsten, ferrovanadium and ferrotitanium, in which the carbon content has been reduced to an insignificant fraction of one per cent. These alloys when "carbon-free" are much more costly than the same alloys with a larger carbon content. The Electro-Metallurgical Company has perfected a cheaper method for reducing the carbon content than the aluminum process.

[2] Another difficulty with American ores is the high silica content, which results in a heavy furnace loss of manganese. Manganese ores containing less than forty-eight per cent manganese and more than eight per cent silica are subject to penalty in trade.

How far the processes of production and origin of raw material affect the competitive situation of American and foreign producers depends in large measure upon the relative importance of ore and conversion costs. Where the electric furnace is employed and the price of hydro-electric power constitutes a large per cent of the total cost, the countries having cheap water power will have an advantage over those in which the price of electric power is high. In blast-furnace operation the price of coke is a determining factor. In the case of most of the ferroalloys the price of ore is a large item in the total expense, and when the ore is imported the competitive position of the American producer is generally dependent upon such factors as comparative ocean freights to this and competing countries and conditions with reference to foreign exchange. How this position varies with the kind and grade of ferroalloys produced may be indicated by comparing the items entering into their cost of manufacture.

The following table gives the average furnace costs of manufacturing the standard grades of spiegeleisen and ferromanganese as reported to the Tariff Commission by several representative companies on copies of their own cost sheets, for the year ending September 30, 1919.[1] The total quantity of spiegeleisen covered by these cost reports was 35,389 gross tons; and of ferromanganese, 83,375 gross tons.

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[1] Moody, *Manual of Railroads and Corporation Securities*, 1920, pp. 1934-5.

TABLE NO. 2

AVERAGE FURNACE COST PER GROSS TON OF PRODUCING SPIEGELEISEN (16 TO 22 PER CENT MANGANESE) AND FERROMANGANESE (70 TO 80 PER CENT MANGANESE) IN BLAST FURNACES IN THE YEAR ENDING SEPTEMBER 30, 1919

	Spiegeleisen.		Ferromanganese.	
	Average cost per gross ton.	Per cent of total cost.	Average cost per gross ton.	Per cent of total cost.
Raw material.	$25.34	41.7	$116.05	72.7
Fuel.	18.62	30.7	22.05	13.8
Labor.	3.77	6.2	6.13	3.8
Supplies and tools. . .	.86	1.4	1.50	.9
Repairs and maintenance.	3.75	6.2	6.02	3.8
Manufacturing overhead .	8.37	13.8	7.92	5.0
Total furnace costs.	$60.71	100.0	$159.67	100.0

It will be observed that the cost of raw materials constituted nearly seventy-three per cent of the total costs in the case of ferromanganese, but only a little over forty per cent in the case of spiegeleisen. The price paid for manganese or manganiferous ores represented over eighty-nine per cent of the bill for raw materials in the case of spiegeleisen and over ninety-seven per cent in the case of ferromanganese. While the cost of fuel was more in the production of ferromanganese than in that of spiegeleisen, it constituted less than fourteen per cent of the total expense in the case of the former and over thirty per cent in the case of the latter.

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[1] *Tariff Information Survey on Articles in Paragraph 102 of the Tariff Act of 1913 and Related Articles in other Paragraphs*, pp. 63 and 64.

It will be seen that the prices of manganese ores form an important part of the total expense in the case of both the iron-manganese alloys. Spiegeleisen, however, is made from domestic ores, the supply of which is abundant and cheap. Producers of ferromanganese, on the other hand, are obliged to rely for the most part upon foreign material, and as the cost of ores constitutes over seventy per cent[1] of the total expense of manufacture, it can readily be seen that the competitive position of the American producer is vitally connected with the relative costs of securing these ores in the United States and in competing countries.

The situation with reference to the manufacture of blast-furnace ferrosilicon (fifteen per cent silicon or less) is similar to that of spiegeleisen, but the conditions regarding the higher grades of this ferroalloy are widely different. Ferrosilicon containing more than fifteen per cent silicon is an electric-furnace product, and the price of power is an important item in the total expense—the importance increasing as the grade rises. Cost data secured by the Tariff Commission with respect to the production of standard-grade ferrosilicon, fifty to sixty per cent silicon content, and the seventy to seventy-five per cent grades, for the year ending September 30, 1919, show the results indicated in the table on the following page.[2]

The raw material consists of silicon rock, coke (used as a reducing agent) and scrap steel, the last of which is the most costly of the three. The price of electric power is a large element in the cost of manufacturing all grades of electric-furnace ferrosilicon, and particularly the higher grades. It is for this reason that the plants of any importance producing this ferroalloy in the United States are almost all located at Niagara Falls, N. Y., where hydro-electric power on a large scale is furnished at lower rates than in any other part of the country. The labor bill is a considerable item, though subordinate to the price of power. The latter is the most important single factor in determining the competitive strength of the American producer.

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[1] In the fall of 1920 the prices of manganese ores declined greatly and later figures than those compiled by the Tariff Commission would show a smaller proportion of the total cost represented by manganese ores. The percentage, however, would still be high.

[2] *Tariff Information Surveys on Paragraph 102*, p. 86. The table shows averages based on the reports of leading manufacturers for the period from October, 1918, to September, 1919.

TABLE NO. 3

COST OF PRODUCING FERROSILICON

	50 to 60 per cent grades		70 to 75 per cent grades.	
	Average cost per gross ton.	Per cent of total cost.	Average cost per gross ton.	Per cent of total cost.
Raw material	$28.14	29.5	$27 07	14.0
Power	25.05	26.2	73.51	37.9
Labor	16.73	17.5	38.25	19.7
Supplies and tools	2.18	2.3	2.72	1.4
Electrodes	4.79	5.0	28.51	14.7
Repairs and maintenance	6.83	7 2	12.78	6.6
Manufacturing overhead	11.82	12.3	10.92	5.7
Total	$95.54	100.0	$193.76	100.00
Amount produced	50,718 gross tons.		886 gross tons.	

The conditions with reference to the manufacture of ferrochrome resemble in part those of ferromanganese and in part those of electric-furnace ferrosilicon. The ore furnishing the chromium content of this ferroalloy is imported and forms the largest single item in the expense of manufacture. The next most important item is the expense of electric power. The cost figures for the most commonly used grades of ferrochrome[1] during the year 1919 were as follows:[2]

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[1] Over 60 per cent chromium content and 4 to 8 per cent carbon.

[2] *Tariff Information Surveys on Paragraph 102*, p. 104.

TABLE NO. 4

COST PER TON OF PRODUCING FERROCHROME IN ELECTRIC FURNACES IN THE UNITED STATES DURING 1919[1]

Item.	Cost per ton of ferrochrome produced.	Per cent of total cost.
Raw material.	$117.24	42.7
Electric power	40.30	14.7
Labor.	34.14	12.4
Supplies and tools	5.18	1.9
Electrodes.	20.58	7.5
Repairs and maintenance	25.18	9.1
Manufacturing overhead.	32.08	11.7
Total	$274.70	100.0

In the above tabulation raw material constituted about forty-three per cent of the total cost and electric power about fifteen per cent. The item of raw material averaged $117.24 per ton, of which the price of chromite at the plants of producers amounted to $104.76, or about forty per cent of the total manufacturing cost. While the cost of electric power constitutes a smaller percentage of the total expense of manufacture than in the cases of standard and higher grades of electric-furnace ferrosilicon, it is large enough to influence producers to locate at points where hydro-electric power is comparatively cheap. The two largest producers of ferrochrome have plants at Niagara Falls, N. Y.

Ferrotungsten is a high-priced ferroalloy, its value being due to the high price or scarcity of the ore. Cost figures obtained by the United States Tariff Commission concerning its cost of production in 1919 show that during that year about eighty per cent of the total expense of manufacture was due to the price of tungsten metal in the ore or concentrate.[1] In 1917 when the price of ferrotungsten was more than double that of 1919 the cost of ore constituted over two-thirds of the selling-value of the ferroalloy. At that time the average price of tungsten-bearing ores in this country was $21.67 per unit[2] of 60 per cent WO_3 in tons of 2,000 pounds. As the conversion factor from tungstic acid to tungsten metal, i. e. from WO_3 to W (tungsten) is 79.3, the cost per pound of metallic tungsten in the concentrate was $1.374. As the average basis for recovery of the metal in the electric furnace is about eighty-five per cent, the cost of the concentrate per pound of tungsten in the ferroalloy was $1.616. The quoted price of ferrotungsten during the year 1917 averaged $2.30 per pound of contained tungsten.[3] Hence the ore out of which ferrotungsten was manufactured constituted about seventy per cent of its quoted selling price in a year when the margin between the value of raw material and quoted prices was exceptionally large.

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[1] The cost figures here given are arithmetical averages of five reporting companies, i. e. averages on the basis of company costs irrespective of the amount of ferrochrome produced. The reason for using this basis is that the great bulk of the ferrochrome produced in 1919 represented the output of one company and hence averages based upon the quantity manufactured would approximate too closely those of the principal producer and hence reveal his expenses of production.

In short, it is evident that the competitive strength of American producers of ferrotungsten and ferromanganese depends almost entirely on the cheapness and availability of the requisite ores. On the other hand, the cheapness of electric power is the vital factor to be considered in the competitive production of electric-furnace ferrosilicon. Both the price of ore and the cost of electric power condition the success of the ferrochrome industry. Quite different is the case of spiegeleisen and blast-furnace ferrosilicon, the raw materials of which are produced in this country and may be converted into the alloys more cheaply here than abroad. Finally, ferrovanadium is in a class by itself, since the output of vanadium is virtually monopolized by an American company.

Ferromanganese has sold at lower prices in England than in the United States. A comparison of the annual averages of

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[1] *Tariff Information Surveys on Paragraph 102*, p. 120.

[2] Ores are often quoted by the unit, or one per cent of the ton. The unit is then 20 or 22.4 pounds depending upon the ton measnre used.

[3] *Tariff Information Surveys on Paragraph 102*, p. 117, and *Chemical and Metallurgical Engineering* for 1917.

British and American prices of standard-grade ferromanganese for the years 1913 to 1920, inclusive, shows the following situation:[1]

TABLE NO. 5

COMPARISON OF BRITISH AND AMERICAN PRICES OF FERROMANGANESE (70 TO 80 PER CENT MANGANESE) 1913–1920

	British prices per gross ton at current rates of exchange.[2]		American prices per gross ton.
	Home.	Export.[3]	
1913	$57.75	$52.21	$57.87
1914	48.44	40.44	55.80
1915	86.43	*	92.21
1916	116.50	164.55	164.12
1917	118.89	274 95	309.17
1918	120.00	260.71	250.00
1919	94.09	102.36	137.24
1920	127.68	149.45	187.50

* Prices vary with destination in 1915.

Except during the year 1918, when American prices were adjusted under government supervision, English export prices were lower than the prices prevailing in the United States, most of the time materially lower. The difference was not due to any technical superiority of the British over the American manufacturer. Neither was it attributable to lower labor costs or cheaper coke. The English blast furnace uses more coke in proportion to its product than does the American; moreover, coke in recent years has been cheaper in the United States than in Great Britain. The cost of converting manganese ore and pig iron or scrap into ferromanganese is lower here than in England. The lower production expense is attributable only to cheaper ore.

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[1] American prices averaged from monthly quotations in *Chemical and Metallurgical Engineering and Metal Statistics,* 1920, published by American Metal Market of New York, and British prices averaged from weekly quotations of the *Iron and Coal Trades Review* (London).

[2] American equivalents for British quotations are on the basis of the normal rates of exchange for 1913 to 1915, inclusive, and on the basis of the reports of the Comptroller of the Currency for 1916 to 1918, inclusive, and quotations in *Annalist* for 1919 and 1920.

[3] Prices in England were controlled by the government during the war period. Exports were regulated by a system of rebates in order to prevent manufacturers from selling their product in too great quantities abroad.

Nearly all the manganese ore used in Great Britain is obtained from India. Prior to 1914 ocean freights to England were much lower than to the United States and even lower than from Brazil to the United States. Much of the ore went from India to England as ballast. The pre-war freight rate on Indian ore shipped to England was about 5s. ($1.22) per ton as against $4.32 per ton when shipped to the United States.[1] In the United States there was the added expense of rail freight from the Atlantic Coast to smelting works located from 200 to 900 miles from the coast, whereas the British furnaces are situated within 40 miles of the coast.

In 1920 ocean freights were fluctuating but averaged much higher than in the pre-war period. Manganese ores shipped from India to the Atlantic seaboard of the United States went on an average rate of about $15 per ton, while to England the rate ranged from £3 to £4, which at an exchange rate of $3.50 to the pound sterling would be equivalent to $10.50 to $14.00. Brazilian ore was shipped to the United States at $8 to $12 per ton.[2] Owing to the higher initial cost of mining this ore in Brazil and transporting it to the coast by rail and paying the provincial export taxes,[3] its price at the Atlantic seaboard of the United States was about as high as Indian ore, while its manganese content averaged less.

In the case of tungsten-bearing ores shipped from China, freight rates to the United States and to England do not seem to differ materially. Nevertheless tungsten concentrate since the war has been selling in England at materially lower prices than in the United States, the difference ranging from $1.50 to $2.50 per unit of long ton. Late in 1919, for example, one of the large English steel corporations was reported to have secured 1,500 tons of tungsten ore, c. i. f., Liverpool, at about 30s. a unit, which at the rate of exchange prevailing at that time would be approximately $5.85 per unit, or nearly $2.00 below the price quoted at the same time in New York.[1]

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[1] *Tariff Information Surveys on Paragraph 102*, p. 65.

[2] *Ibid.*, p. 66.

[3] Export taxes in Brazil on manganese ores are levied by the provincial and not by the federal government.

Comparing this difference in the prices at Liverpool and New York with a similar difference in the British and American prices of Indian manganese ores, we shall find a variation which cannot be attributed to ocean freight rates. As already noted the ocean freights on manganese ores shipped from India to the United States averaged higher in 1920 than similar shipments to England, but the difference was relatively less than before the war. At the beginning of 1920 the price of high-grade manganese ore (48 to 50 per cent manganese) was quoted at $.80 to $.85 per unit, delivered at Baltimore and New York. In England at the same time the price was approximately 3s. 2d. At the normal rate of exchange this would be equivalent to $.77 per unit, from $.03 to $.08 per unit less than at our Atlantic seaboard, or about the difference in the ocean freight on Indian manganese ores to England and the United States. Owing to the greatly reduced rate of exchange on the pound sterling the actual difference in price was much greater. The exchange rate in December, 1919, averaged $3.86, and in January, 1920, was falling rapidly, reaching its lowest point in February when the pound sterling was quoted at $3.18. Taking $3.70, however, as the exchange value of the pound sterling about the middle of January, the English price of manganese ore was approximately $.60 per unit as against $.80 to $.85 per unit in the United States.

During the latter half of 1919 and the greater part of 1920 the prices of manganese and tungsten-bearing ores exhibited similar differences in American and English markets. These differences could not be accounted for by any corresponding variations in ocean freights or banking charges. The differences roughly correspond to the difference between the normal and current rates of exchange on the pound sterling. The prices of these ores were quoted the same plus ocean freights to both English and American buyers, but on the basis of the old normal rates of exchange. As the English pound has ceased to be worth $4.8665 in international trade, the British ferroalloy producers obtained their manganese and tungsten ores at lower prices than their American competitors, by virtue of a depreciated currency.[1]

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[1] *Engineering and Mining Journal,* January 3, 1920, p. 6.

It is of course true that the American manufacturer could purchase English exchange, but the fact remains that, for a long time at least, he did not do so. His reluctance was due partly to the marked fluctuations in the rates of exchange with consequent speculative risks, and partly to certain handicaps in establishment of trading relations.[2] The reduced rates of foreign exchange and the slowness with which prices were adjusted to the new monetary situation in which the world found itself after the great war, have thus served for a time to favor foreign manufacturers in securing raw materials at relatively low prices, measured in terms of gold.

A somewhat similar situation exists with reference to chromite, the raw material in ferrochrome. Most of the imported ferrochrome comes from France, but considerable amounts are made in Norway and England. The quoted ocean freight rates on chromite from New Caledonia and Rhodesia to the Atlantic coast of the United States and northwestern Europe are approximately the same. Much chromite, however, goes as ballast from Rhodesia to northwestern Europe at rates much lower than the quoted ones.[3] Both in the pre-war period and since the signing of the armistice, chromite and ferrochrome have been quoted at lower prices in Norway and France than in the United States. Partly as a result of the lower prices for ore and partly on account of cheaper water power in these European countries, ferrochrome has been selling at much lower prices than in the United States. Even in England, where prices are higher than on the Continent, the quotations on ferrochrome (sixty per cent chromium and six to eight per cent carbon) for the year 1920 averaged at the Sheffield Steel Works about 11½ cents per pound of contained chromium against 19 cents in the United States.[1] It is likely that the exchange situation has also affected the price of chromite in much the same way that it has the prices of manganese and tungsten ores, but evidence on this point is not so clear. The fact that so much chromite goes to Europe as ballast obscures this phase of the situation.

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[1] Charles Hardy in *Engineering and Mining Journal,* January 3, 1920, p. 6. There has been a good deal of nonsense in much of the recent discussion concerning the effect of foreign exchange on trade relations. See *Hearings before Committee on Ways and Means,* House of Representatives, Dec. 9, 10, 14 and 16, 1920. It is, however, a factor which in a period of readjustment is worthy of consideration.

[2] *Engineering and Mining Journal,* January 3, 1920, pp. 5 and 6.

[3] The character and amount of the freight carried by ocean vessels are very important factors in the determination of rates. Where freight either constitutes a return cargo or is of such a character (i. e. heavy and not injured by being wet) that it can be used as ballast, it is often shipped at low or nominal rates. In the pre-war period, almost all the manganese ores shipped from India to

Electric-furnace ferrosilicon presents no problem with reference to raw material, although Canada, which furnishes the United States with the bulk of its imported ferrosilicon, gets the steel scrap used in the manufacture of the alloy cheaper than does this country. The reason for this is that the consumption is greater than the production of steel in Canada. Hence there is an abundance of old material which is not so readily marketed for remanufacture in open-hearth furnaces as in the United States. This difference, however, is not serious and does not greatly affect the American producers' competitive position. Nevertheless the higher grades of ferrosilicon are manufactured more cheaply in Canada than in this country. Canada's cheaper production is almost entirely due to the low price paid for electric power.

England went as ballast. The character of our foreign trade has not favored the importation of the ores as ballast or return cargoes. In the future, conditions may be more favorable.

[1] Figures from *Chemical and Metallurgical Engineering* for United States and the *Iron and Coal Trades Review* (London) for England. The British quotations are given by the long ton. Reduction of British currency to American equivalents is on the basis of the weekly exchange quotations in the *Annalist.*

At Niagara Falls, N. Y., the prevailing rate for hydro-electric power employed for furnace or manufacturing purposes is $20 per horse-power year, or $0.00306 per kilowatt hour. This rate may be compared with similar charges for power in Canada as follows:[1]

TABLE NO. 6

COMPARISON OF CANADIAN AND AMERICAN RATES FOR HYDRO-ELECTRIC POWER

	Per horse-power year.	Per kilowatt hour.
Niagara Falls, N. Y.	$20.00	$0.00306
Toronto, Ontario	14.50	.00222
Welland, Ontario	14.00	.00214 [2]
Ottawa, Ontario	14.00	.00214
Hamilton, Ontario	14.00	.00214

At Shawinigan Falls, Quebec, rates for power advertised or offered to ferroalloy manufacturers range as low as $11.00 per horse-power year ($0.0016 per kilowatt hour). Rates for hydro-electric power in Europe are less susceptible of comparison on account of the demoralized monetary conditions prevailing over the greater part of the Continent. In Norway one American company, according to a contract entered into in 1913, pays a rate of $7.40 per horse-power year, or about $0.0011 per kilowatt hour. Rates only a little higher have prevailed in France.[3]

Though well endowed with water-power resources, the United States is handicapped, as compared with Canada, Norway, Sweden and France, by the lack of a common combination of high heads with steady flow of water. In most parts of the country contracts for the use of hydro-electric power provide for seasons of drought when steam-generated energy is supplied. Seasonal changes operate to keep the price high in this country.

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[1] *Report of Hydro-electrical Power Commission of Ontario*, vol. 2, pp. 192-199.

[2] The leading manufacturer of ferrosilicon in Canada and the largest producer in the world, whose plant is located at Welland, pays $12.75 per horse-power year, or $0.00195 per kilowatt hour.

[3] *Tariff Information Surveys on Paragraph 102*, p. 159.

The greater cost of hydro-electric power thus tends to increase materially the expense of manufacturing the higher grades of ferrosilicon in the United States as compared with competing countries. In a similar way, though to a less extent, the conversion cost of ferrochrome is made higher in this country than in such lands as Norway and France. Taken in connection with cheaper ore (chromite) the active foreign competition in this branch of ferroalloy manufacture is easily explained.

The competitive situation with reference to the ferroalloys above discussed may be shown graphically as follows:

TABLE NO. 7

COMPETITIVE POSITION OF THE FERROALLOY INDUSTRIES

	Source of raw material.	Method of manufacture.	Degree of foreign competition.	Handicaps of American producer.
Iron-manganese alloys:				
Spiegeleisen.	Domestic	Blast furnace	Negligible	None
Ferromanganese . .	Foreign	Blast furnace	Active	Relatively high prices for ores
Ferrosilicon:				
Blast furnace (8 to 15 per cent Si.). . .	Domestic	Blast furnace	Negligible	None
Electric furnace (above 15 per cent Si.) .	Domestic	Electric furnace	Very active	Relatively high prices for power
Ferrochrome	Foreign	Electric furnace	Very active	Relatively high prices for ore and power
Ferrotungsten	Foreign	Electric furnace	Very active	High price for ore
Ferrovanadium. . . .	Foreign	Electric furnace	None	None, due to American control of raw material

The question how far the competitive situation in any industry or group of industries should affect tariff policy is to a large extent a political issue, with which this paper is not concerned. Competitive conditions, with the factors entering into them, are simply indicated. A free-trade policy may be adopted with the law of comparative costs determining in what countries certain industries shall arise and flourish. Or a protective-tariff policy may be pursued as a regular principle or on the ground that the industries are comparatively new with possibilities for the future or on the plea of military and political expediency. In any case a presentation of the competitive situation is necessary to show the probable industrial effect of any tariff program.

The problem of compensatory duties is one of considerable importance in tariff legislation and one of the most difficult to solve. The ignoring of this problem in certain instances has resulted in industrial tragedies. An import duty on a raw or crude product without corresponding rates on its more highly finished forms may be more destructive than protective. But what are corresponding or compensatory rates? This question is not always easy to answer, and in the case of ores and their products, often very difficult. In passing from one stage of production to another, there is usually some loss of material. In some stages of manufacture these losses are definitely known. In the case of the ferroalloys and alloy steels such is not the case. Losses vary with the chemical and physical character of the ore, the process of manufacture, the grade of product, and often the skill of the workmen.

A good illustration showing the variation in metallic recovery or loss is the case of ferrochrome and chrome steel. In the manufacture of ferrochrome from chromite the recovery of metal ranges from about forty-five per cent to ninety per cent. Where American ores are used and the ferroalloy manufactured has a carbon content of two to eight per cent, the loss of chromium ranges from twenty to twenty-five per cent (recovery seventy-five to eighty per cent). If New Caledonian ore is used with its higher chromium and smaller iron content, the loss is reduced to only ten per cent. If, however, the carbon content is reduced to one per cent and the electric furnace process is still employed, as is usually the case, the loss is increased to fifty or fifty-five per cent. Using the highly expensive aluminum process, with its elimination of practically all the carbon, metallic loss is again reduced to only twenty per cent.[1]

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[1] *Tariff Information Surveys on Paragraph 102*, p. 97.

These figures are averages in good practice and form the bases for estimating compensatory duties where the ores themselves are dutiable. Under the Act of 1913 none of the ores used in ferroalloy manufacture is subject to duty, but during the last two years bills have been introduced in Congress imposing tariff rates on chromite, manganese ores and on tungsten-bearing ores. From what has been stated the problem of fixing proper compensatory rates on the ferroalloys, if such bills pass, is seen to be a highly complicated one.

In the same way tariff adjustments are necessary on alloy steels where duties are imposed on the ferroalloys or alloying metals. Taking the case of chrome steel, the loss of chromium from ferro to steel varies considerably. Most chrome steel is made in open-hearth furnaces where the metallic loss in good practice ranges on the average from fifteen to twenty per cent. If, however, the electric furnace is employed the loss is practically nothing.

The metallic recoveries from ore to ferro and from ferro to alloy steel, averaged roughly from a large number of instances in good practice for the principal ferroalloys, are as follows: [1]

TABLE NO. 8

PERCENTAGES OF METAL RECOVERED IN FERROALLOY PROCESSES

	Metallic recovery from ore to alloy.	Metallic recovery from alloy to alloy steel.
Spiegeleisen	80–85 per cent	75–80 per cent
Ferromanganese	80–85 per cent	75–80 per cent
Ferrosilicon	80–85 per cent	75 per cent
Ferrochrome:		85–100 per cent
2-8 per cent carbon	88–90 per cent	
Less than 2 per cent carbon . (electric furnace)	45-70 per cent	
Carbon-free . . . . (aluminum process)	80 per cent	
Ferrotungsten:		
Carbon content 1 per cent or less. (electric furnace)	85 per cent	78 per cent
Carbon-free . . . . (Aluminum process)	80 per cent	80 per cent
Ferrovanadium:		75 per cent
Electric-furnace process	75 per cent	
Carbon-free . . . . (Aluminum process)	80 per cent or over	

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[1] *Tariff Information Surveys on Paragraph 102,* p. 160.

The extreme range of recovery is considerably greater than the figures shown above would indicate, and it would average lower if concerns using only low-grade ores and comparatively inexperienced labor were included. The figures also include recoveries of material wasted in one operation, but utilized in a later one. From what is shown a very tangible tariff problem is presented which is by no means simple and yet must be met, as long as our foreign trade is regulated by tariffs.

The kind of rates used—specific or *ad valorem*—occasionally offers problems which the legislator does not always anticipate when he begins to frame a tariff bill. An *ad valorem* rate imposed upon a class of articles varying greatly in value has the merit of adjusting itself to this variation, assuming proper administration and reliable sources of information with regard to prices in the primary markets of the foreign producing countries. As has been pointed out by many writers, the process of valuing imported commodities is generally expensive, and in large numbers of cases, difficult, if not impossible.

Aside, however, from expense and the difficulty of ascertaining foreign prices, the modern tendency for certain industries to locate in regions and countries where the home market is very limited and foreign markets take the bulk of the product, presents a problem which must also be faced. The nature of the problem may be illustrated by the case of Canadian ferrosilicon. Canada is a large producer of this ferroalloy, but a small consumer. Only about 3,000 or 4,000 tons out of an annual output of over 50,000 tons are consumed at home. Much of this product is now sold in the United States, although during the war Canada exported a considerable amount to England. During the years 1916 to 1918, inclusive, the value per ton at furnace of imported ferrosilicon from Canada was much lower than that of ferrosilicon from other countries, and much below the quoted prices of the American product.[1] While import figures tabulated by the Bureau of Foreign and Domestic Commerce do not show the grades of the imported alloy, figures obtained by the United States Tariff Commission show that the grades of the Canadian product did not average below those from other countries.

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[1] *Tariff Information Surveys on Paragraph 102*, p. 85.

In order to test how far the home price on which valuations for the imported Canadian product were based was below the export price, certain loads of imported ferrosilicon were selected at random for the years 1917 and 1918 with prices at destination and the deductions made by importers. The results were as follows:

TABLE NO. 9

PRICES OF CERTAIN LOTS OF CANADIAN FERROSILICON SHIPPED TO THE UNITED STATES, 1917 AND 1918

	Price per gross ton, f. o. b. destination.	Scale[1] (over or under).	Deductions made by importer per gross ton.
1917	$99 00	$1.95	$22.00
	100.00	2.00	23.00
	93.00	1.65	6.00
	91.00	1.65	14.00
	250.00	5.00	148.19
	99.00	1.95	8.85
	225.00	4.50	133.11
	99.00	1.95	9.03
1918	99.00	1.95	8.72
	99.00	1.95	9.15
	130.00	2 60	9 60
	130.00	2.60	9.42

In the above tabulation the deductions from the prices at destination show the values on which import duties were collected.[2] As practically all the ferrosilicon was shipped short distances—much of it from Welland, Ontario, to Buffalo and Pittsburgh—the transportation cost forms only a small fraction of the deductions made. According to the testimony of a customs official at Buffalo these deductions usually amount to between twenty and forty per cent of the prices in this country. The result is that the *ad valorem* rate of fifteen per cent on the Canadian home price averages about 11.25 per cent on the basis of American selling prices.

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[1] These figures indicate the amounts which may be added to or deducted from the prices given to allow for difference between the grade of ferrosilicon indicated on the invoices and the grade actually shipped.

[2] It will, of course, be remembered that all *ad valorem* duties in the United States are collected on the basis of the prices prevailing at the time of shipment in the primary markets of the country from which the imported articles are shipped.

Where there is a wide difference in the prices of the same article in two countries in such close proximity as Canada and the United States, the price variation will tend to be reduced by exports from one to the other until it amounts to approximately the cost of transportation and the tariff duty. Where, however, the exporting nation consumes only a small fraction of its output and exports much of it to a country imposing an *ad valorem* rate of duty based upon prices in the producing region, home prices will tend to be artificially low.[1] In other words, producers will soon find it to their interest to keep home prices low, in order that tariff rates on their products in their great foreign markets may be reduced.

With the exception of electric-furnace ferrosilicon, the price of which is kept artificially low in Canada and the duties on which are consequently subnormal, the ferroalloys lend themselves more readily to *ad valorem* than to specific tariff rates, because the value of ferroalloys is subject to very wide variation according as the content of the alloy and of carbon may be larger or smaller. In this respect, and also in respect of compensatory duties, all the ferroalloys except ferrosilicon might be regarded as presenting similar problems to the tariff-framer. To over-emphasize this similarity, however, would be most misleading. As has already been pointed out, the competitive position of American ferroalloy manufacturers varies greatly with the kind and grade of ferroalloy produced. It would be difficult indeed to find a better illustration of the necessity of a careful analysis of each group of articles subject to tariff regulation, especially if protective measures are contemplated.

Because of their crucial industrial and military significance, the ferroalloys constitute one of the items around which tariff controversy is most intense, despite the fact that they represent only a very small fraction of the commodities subject to tariff legislation. As long as foreign commerce is viewed from the standpoint of national units, the question of encouraging or safeguarding home producers will arise from time to time, especially in the case of new industrial growths. The significance of this class of products in relation to several of our leading branches of manufacture gives it a special claim to tariff consideration if such claims are admitted for other classes.

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[1] There are several other instances besides the case of ferrosilicon where prices in the home markets of the exporting countries are to all appearances artificially low.

The question how far the restriction of imports by tariff legislation will affect international trade is of interest to the ferroalloy industries as one among many groups. In the year ending June 30, 1920, our total imports of merchandise amounted, in round numbers, to $5,238,000,000.[1] Forty groups of commodities account for eighty-eight per cent of these imports. When it is remembered that in the summer of 1914 our country was indebted abroad to the extent of probably $5,000,000,000 and that at the close of 1920 other nations were indebted to us to the amount of at least $12,000,000,000, another phase of the tariff problem in its more general aspect presents itself. Having arrived at the status of the leading creditor country of the world and being ambitious to build up and maintain an extensive merchant marine, we are face to face with the question of how to regulate imports so that the credit obligations resulting from these conditions can be met. If the tariff is to be revised along protective lines, as seems probable, will the protective principle be selective in operation, allowing these obligations to be paid, as in large part they must be, by imported material? If so, how will the favored industries be selected? We have here a situation that will make the tariff act of 1921 one of the most interesting and significant in the history of our foreign trade policy.

ABRAHAM BERGLUND.

WASHINGTON, D. C.

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[1] Monthly Summary of Foreign Commerce, June, 1920.